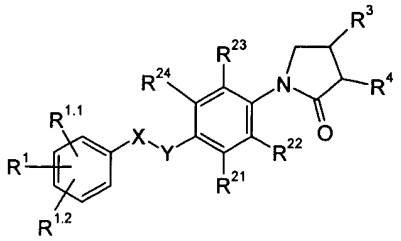
Claims

1. A compound of the formula I



(I)

wherein

X-Y is $-CH_2-CH_2-$, -CH=CH- or $-CH_2-O-$;

R^1, $R^{1.1}$ and $R^{1.2}$ independently from each other are selected from the group consisting of hydrogen, halogen, cyano, (C_1-C_6)-alkyl, halogen-(C_1-C_6)-alkyl, (C_1-C_6)-alkoxy or halogen-(C_1-C_6)-alkoxy;

R^{21}, R^{22} and R^{23} independently from each other are selected from the group consisting of hydrogen and halogen;

R^{24} is hydrogen, halogen or methyl;

R^3 is hydrogen;

R^4 is $-CONHR^5$, -CN or $-NHR^6$;

R^5 is hydrogen or (C_1-C_3)-alkyl; and

R^6 is –CO-H, $-CO-(C_1-C_6)$-alkyl, -CO-halogen-(C_1-C_3)-alkyl, -CO-O-(C_1-C_3)-alkyl, $-CO-NH_2$ or $-SO_2-(C_1-C_6)$-alkyl;

or an individual isomer or racemic or non-racemic mixture thereof.

2. A compound according to claim 1 wherein -X-Y- is $-CH_2-O-$.

3. A compound according to claim 2 wherein R^1, $R^{1.1}$, and $R^{1.2}$ independently are hydrogen, halogen, methyl, halogenmethyl, cyano, methoxy or halogenmethoxy.

4. A compound according to claim 3 wherein R^{21}, R^{22}, R^{23}, and R^{24} are hydrogen.

5. A compound according to claim 4 wherein R^4 is CN.

6. A compound according to claim 4 wherein R^4 is $CONHR^5$ and R^5 is hydrogen or $(C_1$-$C_3)$-alkyl.

7. A compound according to claim 4 wherein R^4 is NHR^6 and R^6 is –CO-H, –CO-$(C_1$-$C_6)$-alkyl, -CO-halogen-$(C_1$-$C_3)$-alkyl, -CO-O-$(C_1$-$C_3)$-alkyl, -$CO-NH_2$ or -SO_2-$(C_1$-$C_6)$-alkyl.

8. A compound according to claim 2 wherein $R^{1.2}$ is hydrogen and R^1 and $R^{1.1}$ independently are each hydrogen, halogen, cyano, $(C_1$-$C_6)$-alkyl, halogen-$(C_1$-$C_6)$-alkyl, $(C_1$-$C_6)$-alkoxy or halogen-$(C_1$-$C_6)$-alkoxy.

9. A compound according to claim 8 wherein R^{21}, R^{22}, R^{23}, and R^{24} are hydrogen.

10. A compound according to claim 9 wherein R^4 is CN.

11. A compound according to claim 9 wherein R^4 is $CONHR^5$ and R^5 is hydrogen or $(C_1$-$C_3)$-alkyl.

12. A compound according to claim 9 wherein R^4 is NHR^6 and R^6 is –CO-H, –CO-$(C_1$-$C_6)$-alkyl, -CO-halogen-$(C_1$-$C_3)$-alkyl, -CO-O-$(C_1$-$C_3)$-alkyl, -$CO-NH_2$ or -SO_2-$(C_1$-$C_6)$-alkyl.

13. A compound according to claim 2 wherein $R^{1.1}$ and $R^{1.2}$ are hydrogen and R^1 is halogen, cyano, $(C_1$-$C_6)$-alkyl, halogen-$(C_1$-$C_6)$-alkyl, $(C_1$-$C_6)$-alkoxy or halogen-$(C_1$-$C_6)$-alkoxy.

14. A compound according to claim 13 wherein R^{21}, R^{22}, R^{23}, and R^{24} are hydrogen.

15. A compound according to claim 14 wherein R^4 is CN.

16. A compound according to claim 14 wherein R^4 is $CONHR^5$ and R^5 is hydrogen or $(C_1$-$C_3)$-alkyl.

17. A compound according to claim 14 wherein R^4 is NHR^6 and R^6 is –CO-H, –CO-$(C_1$-$C_6)$-alkyl, -CO-halogen-$(C_1$-$C_3)$-alkyl, -CO-O-$(C_1$-$C_3)$-alkyl, -CO-NH_2 or -SO_2-$(C_1$-$C_6)$-alkyl.

18. A compound according to claim 17 wherein R^1 is halogen and R^6 is –CO-$(C_1$-$C_6)$-alkyl.

19. A compound according to claim 18 wherein R^6 is $COCH_3$.

20. A compound according to claim 2 wherein R^1, $R^{1.1}$, $R^{1.2}$, R^{21}, R^{22}, R^{23}, and R^{24} are hydrogen.

21. A compound according to claim 20 wherein R^4 is CN.

22. A compound according to claim 20 wherein R^4 is $CONHR^5$ and R^5 is hydrogen or $(C_1$-$C_3)$-alkyl.

23. A compound according to claim 20 wherein R^4 is NHR^6 and R^6 is –CO-H, –CO-$(C_1$-$C_6)$-alkyl, -CO-halogen-$(C_1$-$C_3)$-alkyl, -CO-O-$(C_1$-$C_3)$-alkyl, -CO-NH_2 or -SO_2-$(C_1$-$C_6)$-alkyl.

24. A compound according to claim 1 wherein R^{21}, R^{22}, and R^{23} are hydrogen.

25. A compound according to claim 1 wherein R^{24} is hydrogen.

26. A compound according to claim 1 wherein R^4 is $-CONHR^5$, wherein R^5 is hydrogen or $(C_1\text{-}C_3)$-alkyl.

27. A compound according to claim 26 wherein R^5 is hydrogen or methyl.

28. A compound according to claim 1 wherein R^4 is –CN.

29. A compound according to claim 1 wherein R^4 is $-NHR^6$, wherein R^6 is –CO-H, $-CO\text{-}(C_1\text{-}C_6)$-alkyl, -CO-halogen-$(C_1\text{-}C_3)$-alkyl, -CO-O-$(C_1\text{-}C_3)$-alkyl, $-CO\text{-}NH_2$ or $-SO_2\text{-}(C_1\text{-}C_6)$-alkyl.

30. A compound according to claim 29 wherein R^6 is –CO-H, $-CO\text{-}CH_3$, -CO-O-CH_3, $-CO\text{-}NH_2$ or $-SO_2\text{-}CH_3$.

31. A compound according to claim 1 wherein the compound has (S)-configuration

32. A compound according to claim 1 wherein the compound has (R)-configuration.

33. A compound according to claim 1 wherein R^1, $R^{1.1}$ and $R^{1.2}$ independently from each other are selected from the group consisting of hydrogen, halogen, methyl, halogenmethyl, cyano, methoxy or halogen-methoxy.

34. A compound according to claim 1 wherein $R^{1.2}$ is hydrogen and R^1 and $R^{1.1}$ independently from each other are selected from the group consisting of hydrogen, halogen, cyano, (C_1-C_6)-alkyl, halogen-(C_1-C_6)-alkyl, (C_1-C_6)-alkoxy or halogen-(C_1-C_6)-alkoxy.

35. A compound according to claim 34 wherein $R^{1.1}$ is hydrogen.

36. A compound according to claim 35 wherein R^1 is halogen, methyl, halogenmethyl, cyano, methoxy or halogen-methoxy.

37. A compound according to claim 36 wherein R^1 is halogen.

38. A compound according to claim 37 wherein R^1 is fluoro.

39. A compound according to claim 38, wherein R^1 is 3-fluoro or 4-fluoro.

40. A compound according to claim 37 wherein R^1 is chloro.

41. A compound according to claim 40 wherein R^1 is 3-chloro.

42. A compound according to claim 36 wherein R^1 is halogenmethyl.

43. A compound according to claim 42 wherein R^1 is 3-trifluoromethyl or 4-trifluoromethyl.

44. A compound according to claim 36 wherein R^1 is CN.

45. A compound according to claim 36 wherein R^1 is methoxy.

46. A compound according to claim 45 wherein R^1 is 2-methoxy, 3-methoxy, or 4-methoxy.

47. A compound according to claim 36 wherein R^1 is halogenmethoxy.

48. A compound according to claim 47 wherein R^1 is 3-trifluoromethoxy.

49. A compound according to claim 34 wherein $R^{1.2}$ is hydrogen and R^1 and $R^{1.1}$ independently are each halogen or $(C_1\text{-}C_6)$-alkyl.

50. A compound according to claim 49 wherein $R^{1.2}$ is hydrogen, $R^{1.1}$ is halogen, and R^1 is halogen or $(C_1\text{-}C_6)$-alkyl.

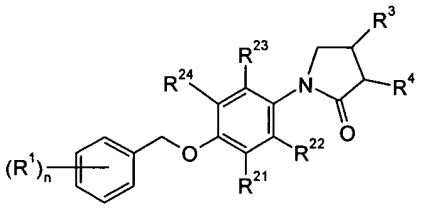
51. A compound according to claim 1 wherein R^1, $R^{1.1}$, and $R^{1.2}$ are halogen.

52. A compound according to claim 51 wherein R^1, $R^{1.1}$, and $R^{1.2}$ are fluoro.

53. A compound according to claim 52 wherein R^1, $R^{1.1}$, and $R^{1.2}$ are 2,4,6-trifluoro, 2,4,5-trifluoro, 2,3,6-trifluoro, 2,3,4-trifluoro, or 3,4,5-trifluoro.

54. A compound according to claim 1 wherein R^1, $R^{1.1}$, and $R^{1.2}$ are hydrogen.

55. A compound of the formula I*



(I*)

wherein

R^1 is halogen, halogen-$(C_1\text{-}C_6)$-alkyl, cyano, $(C_1\text{-}C_6)$-alkoxy or halogen-$(C_1\text{-}C_6)$-alkoxy;

R^{21}, R^{22}, R^{23} and R^{24} independently from each other are selected from the group consisting of hydrogen and halogen;

R^3 is hydrogen;

R^4 is $-CONHR^5$, $-CH_2CN$, -CN or $-NHR^6$;

R^5 is hydrogen or C_1-C_3-alkyl;

R^6 is $-CO-(C_1-C_6)$-alkyl or $-SO_2-(C_1-C_6)$-alkyl; and

n is 0, 1, 2 or 3;

or an individual isomer or racemic or non-racemic mixture thereof.

56. A compound according to claim 55 wherein R^3 is hydrogen, R^4 is CN, $CONHR^5$ or CH_2CN.

57. A compound according to claim 55 wherein R^4 is $CONHR^5$ and R^5 is hydrogen or (C_1-C_3)-alkyl.

58. A compound according to claim 55 wherein R^4 is CN.

59. A compound according to claim 55 wherein R^4 is NHR^6 and R^6 is $-CO-(C_1-C_6)$-alkyl or $-SO_2-(C_1-C_6)$-alkyl.

60. A compound according to claim 55 wherein R^3 is hydrogen, R^4 is NHR^6 and R^6 is $-CO-(C_1-C_6)$-alkyl or $-SO_2-(C_1-C_6)$-alkyl.

61. A compound according to claim 55 wherein R^1 is halogen or halogen-(C_1-C_6)-alkyl.

62. A compound according to claim 61 wherein R^1 is fluoro, chloro, or trifluoromethyl.

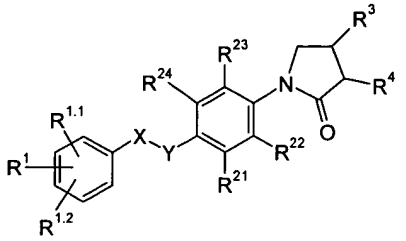
63. A compound according to claim 55 wherein n is 1 or 2.

64. A compound selected from the group consisting of
(RS)-1-(4-benzyloxy-phenyl)-2-oxo-pyrrolidine-3-carbonitrile,
(RS)-1-[4-(3-fluoro-benzyloxy)-phenyl]-2-oxo-pyrrolidine-3-carboxylic acid methylamide,
(RS)-1-[4-(3-fluoro-benzyloxy)-phenyl]-2-oxo-pyrrolidine-3-carboxylic acid amide,
(RS)-1-[4-(4-fluoro-benzyloxy)-phenyl]-2-oxo-pyrrolidine-3-carboxylic acid amide,
(RS)-1-[4-(4-fluoro-benzyloxy)-phenyl]-2-oxo-pyrrolidine-3-carboxylic acid methylamide,
(RS)-2-oxo-1-[4-(4-trifluoromethyl-benzyloxy)-phenyl]-pyrrolidine-3-carboxylic acid amide, and
(RS)-2-oxo-1-[4-(4-trifluoromethyl-benzyloxy)-phenyl]-pyrrolidine-3-carboxylic acid methylamide.

65. A compound selected from the group consisting of
(S)-N-[1-(4-benzyloxy-phenyl)-2-oxo-pyrrolidin-3-yl]-acetamide,
(S)-N-[1-(4-benzyloxy-phenyl)-2-oxo-pyrrolidin-3-yl]-methanesulfonamide,
(S)-N-{1-[4-(3-fluoro-benzyloxy)-phenyl]-2-oxo-pyrrolidin-3-yl}-acetamide,
(R)-N-{1-[4-(3-fluoro-benzyloxy)-phenyl]-2-oxo-pyrrolidin-3-yl}-acetamide,
(R)-N-{1-[4-(3-fluoro-benzyloxy)-phenyl]-2-oxo-pyrrolidin-3-yl}-methanesulfonamide,
(S)-N-{1-[4-(3-fluoro-benzyloxy)-phenyl]-2-oxo-pyrrolidin-3-yl}-methanesulfonamide, and
(S)-{1-[4-(3-fluoro-benzyloxy)-phenyl]-2-oxo-pyrrolidin-3-yl}-carbamic acid methyl ester.

66. A compound selected from the group consisting of
(R)-N-{1-[4-(3-fluoro-benzyloxy)-phenyl]-2-oxo-pyrrolidin-3-yl}-formamide,
(S)-N-{1-[4-(3-fluoro-benzyloxy)-phenyl]-2-oxo-pyrrolidin-3-yl}-formamide,
(R)-{1-[4-(3-fluoro-benzyloxy)-phenyl]-2-oxo-pyrrolidin-3-yl}-urea,
(S)-{1-[4-(3-fluoro-benzyloxy)-phenyl]-2-oxo-pyrrolidin-3-yl}-urea,
(S)-N-{1-(S)-[4-(4-fluoro-benzyloxy)-phenyl]-2-oxo-pyrrolidin-3-yl}-acetamide,
(S)-N-{1-(S)-[4-(2,6-difluoro-benzyloxy)-phenyl]-2-oxo-pyrrolidin-3-yl}-acetamide, and
(S)-N-{1-[4-(3,4-difluoro-benzyloxy)-phenyl]-2-oxo-pyrrolidin-3-yl}-acetamide.

67. A composition comprising a compound of formula I



(I)

wherein

X-Y is $-CH_2-CH_2-$, -CH=CH- or $-CH_2-O-$;

R^1, $R^{1.1}$ and $R^{1.2}$ independently from each other are selected from the group consisting of hydrogen, halogen, cyano, (C_1-C_6)-alkyl, halogen-(C_1-C_6)-alkyl, (C_1-C_6)-alkoxy or halogen-(C_1-C_6)-alkoxy;

R^{21}, R^{22} and R^{23} independently from each other are selected from the group consisting of hydrogen and halogen;

R^{24} is hydrogen, halogen or methyl;

R^3 is hydrogen;

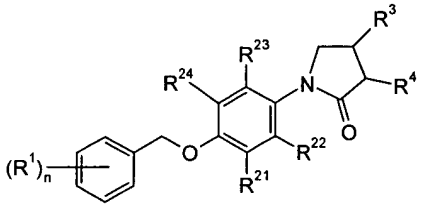
R^4 is $-CONHR^5$, -CN or $-NHR^6$;

R^5 is hydrogen or (C_1-C_3)-alkyl; and

R^6 is –CO-H, $-CO-(C_1-C_6)$-alkyl, -CO-halogen-(C_1-C_3)-alkyl, -CO-O-(C_1-C_3)-alkyl, $-CO-NH_2$ or $-SO_2-(C_1-C_6)$-alkyl;

or an individual isomer or racemic or non-racemic mixture thereof, and a pharmaceutically acceptable carrier.

68. A composition comprising a compound of formula I*



(I*)

wherein

R^1 is halogen, halogen-(C_1-C_6)-alkyl, cyano, (C_1-C_6)-alkoxy or halogen-(C_1-C_6)-alkoxy;

R^{21}, R^{22}, R^{23} and R^{24} independently from each other are selected from the group consisting of hydrogen and halogen;

R^3 is hydrogen;

R^4 is $-CONHR^5$, $-CH_2CN$, -CN or $-NHR^6$;

R^5 is hydrogen or C_1-C_3-alkyl;

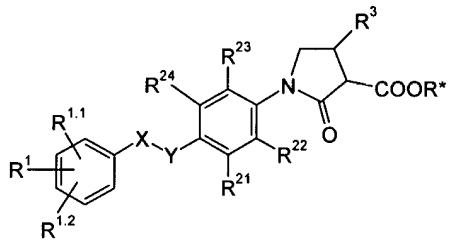
R^6 is $-CO-(C_1-C_6)$-alkyl or $-SO_2-(C_1-C_6)$-alkyl; and

n is 0, 1, 2 or 3;

or an individual isomer or racemic or non-racemic mixture thereof, and a pharmaceutically acceptable carrier.

69. A process for the preparation of compounds of formula I according to claim 1 wherein R^4 is $CONHR^5$

comprising reacting a compound of formula II



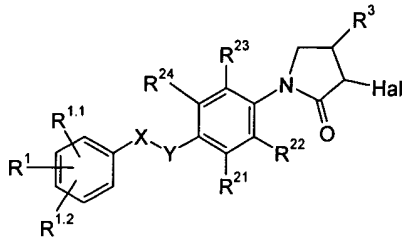
(II)

wherein R^1, $R^{1.1}$, $R^{1.2}$, R^{21}, R^{22}, R^{23}, R^{24}, R^3, X and Y have the meanings as defined in claim 1 and R* is hydrogen or (C_1-C_6)-alkyl,

with an amine of formula H_2N-R^5, wherein R^5 has the meaning in claim 1.

70. A process for the preparation of compounds of formula I according to claim 1 wherein R^4 is CN

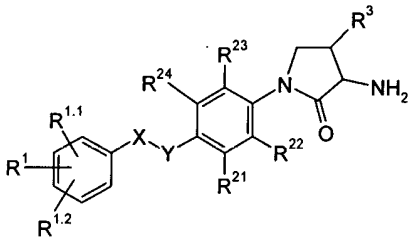
comprising reacting a compound of formula III



(III)

wherein R^1, $R^{1.1}$, $R^{1.2}$, R^{21}, R^{22}, R^{23}, R^{24}, R^3, X and Y have the meanings as defined in claim 1 and Hal is halogen,
with a cyanide salt.

71. A process for the preparation of compounds of formula I according to claim 1 wherein R^4 is NHR^6
comprising reacting a compound of formula IV



(IV)

wherein R^1, $R^{1.1}$, $R^{1.2}$, R^{21}, R^{22}, R^{23}, R^{24}, R^3, X and Y have the meanings as defined in claim 1,
with an acyl donating agent of formula Z–CO-H, Z–CO-(C_1-C_6)-alkyl, Z-CO-halogen-(C_1-C_3)-alkyl, Z-CO-O-(C_1-C_3)-alkyl, or Z-SO_2-(C_1-C_3)-alkyl wherein Z is an activating group.

72. A method for the treatment of Alzheimer's disease comprising administering to an individual a therapeutically effective amount of a compound of claim 1.

73. A method for the treatment of senile dementia comprising administering to an individual a therapeutically effective amount of a compound of claim 1.